

The English translation of the patentable claims in the JPO application

CLAIMS

1. A write-once-type recording medium comprising:
a data area to record therein record data; and
a plurality of management areas in which a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times,
each of the plurality of management areas having a setup area for recording therein a management information block including a plurality of types of management information constructed from the newest management information and the index information indicating the plurality of types of management information constructed from the newest management information.
2. The write-once-type recording medium according to claim 1, wherein the setup area is prepared at a head position of each of the plurality of management areas or near the head position.
3. The write-once-type recording medium according to claim 1, wherein the index information is disposed at the end of the plurality of types of management information.
4. The write-once-type recording medium according to claim 1, wherein the plurality of management areas are dispersedly disposed on a recording surface of said write-once-type recording medium.
5. The write-once-type recording medium according to claim 1, wherein

The English translation of the patentable claims in the JPO application the plurality of types of management information includes at least one of defect management information for managing a defect in the data area, space bitmap information for managing a state of distribution of the record data on the data area and sequential recording management information for managing a state of distribution of the record data on a recording track to record the record data.

6. A recording apparatus for recording record data onto a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas in which a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times,

said recording apparatus comprising:

a first recording device for recording the record data into the data area;

an updating device for updating the index information and at least one of the plurality of types of management information;

a detecting device for detecting whether or not the updated index information is to be in a condition such as indicating management information recorded in a different management area;

a second recording device for recording the index information and the at least one of the plurality of types of management information which are updated, into an in-use management area, if the updated index information is not to be in the condition such as indicating management information recorded in a different management area; and

a third recording device for recording a management information block including a plurality of types of management information constructed from

The English translation of the patentable claims in the JPO application newest management information and the index information, into an un-used management area, if the updated index information is to be in the condition such as indicating management information recorded in a different management area.

7. The recording apparatus according to claim 6, wherein said detecting device detects whether or not the index information is to be in a condition such as indicating management information recorded in a different management area, on the basis of a free space of the in-use management area.

8. The recording apparatus according to claim 6, wherein said third recording device records the management information block at a head position of the un-used management area or near the head position.

9. The recording apparatus according to claim 6, further comprising an obtaining device for obtaining the plurality of types of management information constructed from newest management information, one the basis of the index information recorded last time.

10. A computer program of instructions for tangibly embodying a program of instructions executable by a computer to make the computer function as the recording apparatus according to claim 6.

11. A recording method of recording record data onto a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas in which a plurality of types of management information for managing the record data and index information

The English translation of the patentable claims in the JPO application for indicating newest management information can be recorded a plurality of times,

said recording method comprising:

a first recording process of recording the record data into the data area;

an updating process of updating the index information and at least one of the plurality of types of management information;

a detecting process of detecting whether or not the updated index information is to be in a condition such as indicating management information recorded in a different management area;

a second recording process of recording the index information and the at least one of the plurality of types of management information which are updated, into an in-use management area, if the updated index information is not to be in the condition such as indicating management information recorded in a different management area; and

a third recording process of recording a management information block including a plurality of types of management information constructed from newest management information and the index information, into an un-used management area, if the updated index information is to be in the condition such as indicating management information recorded in a different management area.

12. A write-once-type recording medium comprising:

a data area to record therein record data; and

a plurality of management areas, wherein

a plurality of types of management information for managing the record data and index information for indicating newest management

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the index information and all management information indicated by a newest index information, which are recorded in each of the plurality of management area, are disposed in same management area.

13. The write-once-type recording medium according to claim 12 wherein the all management information indicated by the newest index information is disposed at a head position of the one of the plurality of management area or near the head position.

14. The write-once-type recording medium according to claim 12, wherein the index information is disposed at the end of the plurality of types of management information.

15. The write-once-type recording medium according to claim 12, wherein the plurality of management areas are dispersedly disposed on a recording surface of said write-once-type recording medium.

16. The write-once-type recording medium according to claim 12, wherein the plurality of types of management information includes at least one of defect management information for managing a defect in the data area, space bitmap information for managing a state of distribution of the record data on the data area and sequential recording management information for managing a state of distribution of the record data on a recording track to record the record data.

The English translation of the patentable claims in the JPO application

17. A recording apparatus for recording record data onto a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas in which a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times,

said recording apparatus comprising:

a first recording device for recording the record data into the data area;

a detecting device for detecting the management area in which newest index information is recorded;

an updating device for updating the management information and the index information;

a judging device for judging whether or not the index information and the management information which are updated by said updating device can be recorded into the management area which is detected by said detecting device; and

a second recording device for recording the updated index information and all management information indicated by the updated index information, into another management area in which the updated index information and the all management information indicated by the updated index information can be recorded, if it is judged by said judging device that the index information and the management information which are updated cannot be recorded.

18. The recording apparatus according to claim 17, wherein the another management area is an un-used management area.

19. The recording apparatus according to claim 17, wherein said judging

The English translation of the patentable claims in the JPO application device judges whether or not the index information and the management information which are updated by said updating device can be recorded into the management area, on the basis of a free space of the management area which is detected by said detecting device.

20. A recording apparatus for recording record data onto a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas, wherein (iii) a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times in each of the plurality of management areas,

said recording apparatus comprising:

a first recording device for recording the record data into the data area;

and

a second recording device for recording the index information and all management information indicated by newest index information into same management areas, with respect to each of the plurality of management areas.

21. A recording method of recording record data onto a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas in which a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times,

said recording method comprising:

a first recording process of recording the record data into the data area;

The English translation of the patentable claims in the JPO application

a detecting process of detecting the management area in which newest index information is recorded;

an updating process of updating the management information and the index information;

a judging process of judging whether or not the index information and the management information which are updated by said updating process can be recorded into the management area which is detected by said detecting process; and

a second recording process of recording the updated index information and all management information indicated by the updated index information, into another management area in which the updated index information and the all management information indicated by the updated index information can be recorded, if it is judged by said judging process that the index information and the management information which are updated cannot be recorded.

22. A reproducing apparatus for reproducing record data recorded on a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas, wherein (iii) a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times in each of the plurality of management areas, and (iv) the index information and all management information indicated by a newest index information, which are recorded in each of the plurality of management area, are disposed in same management area,

said reproducing apparatus comprising:

a detecting device for detecting the management area in which newest index information is recorded, from among the plurality of management areas;

The English translation of the patentable claims in the JPO application

an extracting device for extracting the newest index information in the management area which is detected by said detecting device;

an obtaining device for obtaining all management information in same management areas indicated by the index information which is extracted by said extracting device; and

a reproducing device for reproducing the record data, on the basis of the management information obtained by said obtaining device.

23. A reproducing method of reproducing record data recorded on a write-once-type recording medium comprising: (i) a data area to record therein the record data; and (ii) a plurality of management areas, wherein (iii) a plurality of types of management information for managing the record data and index information for indicating newest management information can be recorded a plurality of times in each of the plurality of management areas, and (iv) the index information and all management information indicated by a newest index information, which are recorded in each of the plurality of management area, are disposed in same management area,

said reproducing method comprising:

a detecting process of detecting the management area in which newest index information is recorded, from among the plurality of management areas;

an extracting process of extracting the newest index information in the management area which is detected by said detecting process;

an obtaining process of obtaining all management information in same management areas indicated by the index information which is extracted by said extracting process; and

a reproducing process of reproducing the record data, on the basis of the management information obtained by said obtaining process.